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process often repeated, and from successively contracted bases, has led to the present condition.

The existing system of restricted genera, however, is too firmly fixed to revert back to a method that might have been, and which indeed Cuvier attempted to introduce by his revised Linnæan genera and their subgenera. The best thing to do now is to accept the current system, purified as much as possible by judicious and inexorably applied laws. Doubtless in the distant future a less cumbrous and changeable system of notation will be devised, but in the meantime we had best put up with the present, inconvenient though it be.

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SECTION F.—ZOOLOGY.

THE results of the late meeting at Buffalo of Section F, of the A. A. A. S., may be regarded as satisfactory. The average attendance at the sessions, which continued without interruption from Tuesday morning to Thursday evening, was thirty-five. Twelve of the one hundred and ten members elected at Buffalo chose this section. Twenty-five papers besides the address of Vice-President Gill were offered; two, however, were withdrawn—one to be given by the President of the Association as a public lecture and one to be read in Section E. The remaining twenty-three were read by their authors, with the exception of that of Mr. Miles, read by C. C. Nutting.

1. The first paper was by U. S. Entomologist L. O. Howard 'On the Entomological Results of the Exploration of the British West India Islands by the British Association for the Advancement of Science,' detailing the steps by which this important investigation had been brought about, and summarizing the results of the different papers which have been published since the beginning of the investigation. He eulogized

the British Committee for its conception of the work and the liberality with which it has been carried on, showed the importance of the results so far achieved, and made a plea for the association of entomologists with scientific expeditions in this country, and for the close collecting of insects, which has apparently been heretofore considered as of less importance than the collection of higher animals and plants.

2. The second paper was by Mr. F. M. Webster, who discussed cases among insects where a species unarmed and in no way capable of protecting itself was, to a certain extent, protected by its resemblance to armed species, or such as are known to be distasteful. Others, by their actions, mimicked the movements of certain other species, and were thereby mistaken for such as are inedible. The ground was taken that birds, after learning that certain insects were not fit for food, would shun any other insects appearing like these, wherever they might come in contact with them, even though at a different season of the year. There may be cases where one species mimics another, when the enemy has become exterminated and no protection is needed. Caution was enjoined against hasty and immature conclusions, as there is much to be learned in the matter, but no facts should be cast aside as mere coincidences, when more facts would enable us to push the problem to a point nearer a solution. That insects, especially, gain protection from their coloration and movements is assured, but much caution is necessary before conclusions are reached. The paper was illustrated by specimens.

3. Prof. A. D. Hopkins, of Morgantown, W. Va., under the title 'On Life Zones in West Virginia,' gave in detail the work he had done in mapping these zones in his State as indicated by the insect fauna.

4. 'The Variations of certain Species of North American Odonata' was a paper

read by D. S. Kellicott giving the results of observations on the variations in size, appendages and coloration of *Enallagma carunculatum* Morse, *Gomphus fraternus* Say, and *G. externus* Selys. It was shown that the size of these odonates is remarkably constant in Ohio. That the male abdominal appendages are almost without variation, affording the most reliable generic and specific characters; and that many color markings commonly used in description are too inconstant to be relied upon independent of structural characters.

5. 'A Case of Excessive Parasitism' was then briefly described by L. O. Howard. He described in some detail the facts concerning the rearing of one hundred and twenty-seven specimens of six species and five genera of Chalcididæ from the *Lecanium* scales on a twig of arbor vitæ received from Ottawa, Canada.

6. 'Notes on the Occurrence of Dragonflies in Ohio in 1896' was a second paper by D. S. Kellicott which stated that *Odonata* have been unusually abundant in Ohio the present season, which was unexpected, inasmuch as the seasons of 1894 and 1895 were those of extreme drouth, causing the water to wholly disappear from ponds and streams over wide areas. It would appear to be a fair inference that the nymphs can sustain themselves in the mud or in cavities of the dry earth during periods of prolonged drouth. Many species appeared weeks, and in some cases months, before the usual date. This was thought to be due to continuous hot weather, beginning April 10th. At Columbus ten species were taken in April.

7. 'Scyllarus and Anemonia—A case of Semi-commensalism,' by Edward L. Rice, referred to a specimen of *Scyllarus*, confined in the same aquarium with *Anemonia*, was observed to lie habitually in the vicinity of the anemone, returning to the same when placed in a distant part of the tank

among stones or algæ, furnishing ideal nooks for concealment. This case is of interest, in connection with the well-known extreme symbiosis of *Pagurus* and *Adamsia*, as showing that the Crustacean seeks the anemone, probably gaining protection from the nematocysts of the latter.

8. This ended the papers and discussions of the first day. The second, Wednesday, was begun promptly with a fair attendance; the first paper was by Prof. C. W. Hargitt, entitled 'Notes upon *Cordylophora*.' *Cordylophora* has long been known to be capable of existence under a wide range of conditions. In December, 1895, a colony of these hydroids, growing on a bit of slag in company with several specimens of acorn barnacles were brought to the writer in a pint of brackish water. They remained in a jar in the laboratory for several weeks and were twice frozen almost solid; they were then supposed to be dead and were set aside. After some time the water was partly poured off and replaced from the top and once more set aside when the barnacles were seen to be alive; then specimens of *Ocypris* were put in the jar for food. Late in May there were no signs of life; the water was again poured off and replaced from the top. After several weeks it was noticed that there were several colonies of the hydroids feeding freely. The barnacles also were alive. Both forms had withstood freezing and confinement in a limited quantity of water which had been gradually changed from sea water to fresh water. The hydroids were still alive August 20th.

9. The first of the morphological papers was read by Mrs. Susanna P. Gage, on 'Modification of the Brain during Growth.' A brief abstract follows:

1. The greater bends of the brain tube are associated with early development of the eye and its nerve fibers, the post-commissure, the ventral commissure and the fifth nerve.

2. The pons-bend is increased by a fold of the membranous roof of the brain which coalesces and extends from the outside of the brain-tube to meson.

3. The thin walls of the cerebrum, the tela and plexuses, are really laterally continuous with the membranous roof of the diencephal.

4. The dorsal and ventral zones of His have not been identified in the forms studied—cat, turtle, bird and Amphibia; rather the indications are of a segmental arrangement of the parts of the brain with a secondary formation of sulci which probably have a wide morphological significance.

10. 'A Note on the Membranous Roof of the Prosencephal and Diencephal of Ganoids,' by B. F. Kingsbury, was an interesting discussion in the neurology of species of fishes named below. Principal stress was laid on the evaginations of membranous roof of the ganoid brain—the *paraphysis*, *dorsal sack* and *epiphysis*. He emphasized the presence of a paraphysis, occurrence and value of the 'dorsal sack' and the existence of a second epiphysial structure in the adult *Amia* and its innervation. The forms discussed were *Amia*, *Lepidosteus*, *Aci-penser* and *Polyodon*.

11. The same author followed with 'The Structure and Morphology of the Oblongata of Fishes.' He discussed the regions which make up the dorsal portion of the oblongata in Ganoids and Teleosts: (1) The spinal, ascending Vth tract, (2) the homologue of the fasciculus communis of the Amphibian brain, (3) center for the auditory nerve and the nerves of the lateral line system. He referred also to the modifications of these regions in *Amia*, *Lepidosteus* and *Aci-penser* and in representatives of thirteen families of Teleosts and the fusions that occur. Two results may be mentioned: the vagus nerve derives a small part of its fibers from the spinal V tract (in some).

The *lobus vagi* and *lobus trigemini* are but differentiated parts of the same tract (*fasciculus communis*).

Mr. Kingbury's second paper concluded the work of the morning session of Wednesday. The afternoon sessions opened by two papers devoted to methods of science teaching in the secondary schools:

12. 'Differentiation of work in Zoology—in Secondary Schools,' by Wm. Orr, Jr., and

13. 'Field Work and its Utility,' by Jas. G. Needham.

Both papers were received with deep interest and were discussed at length. That the matter presented bids fair to receive due attention in the future is attested by the fact that a joint meeting of representatives of Sections G and F agreed that it is desirable at the next meeting of the Association to have arranged in advance a joint meeting of the Sections for the consideration of questions relating to teaching, etc. The plan was adopted by Section F.

14. The above papers and discussions were followed by an illustrated paper by Miss Agnes M. Claypole on 'Appendages of an Insect Embryo.'

The form used was identified as *Anurida maritima* Guerin, and was collected under stones on the beach at Woods Holl, Mass. It belongs to a wingless group of Insecta, the Collembola, and is the first form of the group as yet studied in microscopic sections.

The cleavage of the egg is complete, holoblastic, a character belonging to this group of insects only, all the others having central cleavage. The appearance of the appendages takes place very early, the antennæ being the first of the series; following the antennæ is a pair of very small appendages on the body segment, carrying what is well known to be the third brain segment. Behind these the mandibles, 1st maxillæ and 2d maxillæ appear successively, in turn followed again by the thoracic ap-

pendages. All of these organs increase in size excepting the small pair on the third segment which remains unchanged till the mouth parts and antennæ have assumed almost distinctive characters. Then these small ones begin to grow as a ridge down each side of the three pairs of mouth parts and finally form a wide plate-like appendage enclosing the mandibles and second maxillæ entirely. In the adult the mouth parts are known to be enclosed in a tube or to be 'drawn in' as the condition is usually described. If, as generally acknowledged, the insect antennæ are considered homologous with the first pair of antennæ of the Crustacean, a point of considerable interest is developed. The appendage of the third segment has been found in many insect embryos, but in all cases is a purely embryonic structure; it disappears before hatching. Among terrestrial Crustaceans, the wood lice for example, the second pair of antennæ is reduced to an extremely small size. Hence *Anurida* is an interesting form showing an insect in which the second pair of antennæ of the Crustaceans is present and functional in the adult; the function, however, is completely changed.

15. The first paper Thursday morning was a valuable one by Miss Isabella M. Green on 'The Peritoneal Epithelium in Amphibia.' The principal results of this investigation may be summed up as follows:

1. Cilia were present upon parts of the peritoneum of all the adult females studied.

2. Cilia were constant upon the following parts, hepatic ligament, the ventral wall of the body cavity, the membranes near the mouth of the oviduct and the serosa of the liver.

3. In *Necturus* some of the adult females showed cilia also upon the dorsal wall of the body cavity.

4. Specimens of *Amblystoma* taken both before and after ovulation and in August

differed from the other species in having cilia upon the mesoarium and the membranes supporting the oviduct.

From the fact that the cilia are present in the adult female and that the direction of the current produced by them is toward and into the mouth of the oviduct, it seems, without doubt, that the physiological purpose of the cilia is to carry the ova to the oviducts.

16. 'The Heart of the Lungless Salamanders of Cayuga Lake,' by Grant S. Hopkins, followed in which it was shown that the current statement regarding the heart of the amphibia must be modified somewhat, for in the lungless salamanders the post cava (or sinus venosus) does not open into the right auricle any more directly than into the left. The auricles communicate with each other very freely. The writer had not been able to make out the presence of pulmonary veins opening into the left auricle, in the lungless forms. One additional lungless salamander was added to the list.

17. 'Observations on the Chameleon, *Anolis principalis*,' by Geo. V. Reichel. This paper treated of the American anolid with observations made by the author concerning its power to change color, its habits, and suggested the possible use of the chameleon as an exterminator of flies and other dwelling house insect-pests.

18. The afternoon session was opened by a paper by Manly Miles read in the absence of the author by C. C. Nutting. The title was 'The Relative Efficiency of Animals as Machines.' It was an inquiry as to the relative efficiency of different classes of animals in utilizing the potential energy of their food in useful work; approximate quantitative estimates were given of the expenditure of energy in making 100 lbs. of increase in fattening animals and the relative expenditure in repairs of the animal machine. A similar estimate was given of the utilization of energy in milk production.

19. 'Some Abnormal Chick Embryos,' was a paper by C. W. Hargitt, reviewing some of the more striking facts of teratology, of the time. Also noticing the remarkable advances and significance of modern embryology, and the apparent climax as shown in the striking experiments of Driesch, Roux, Wilson and others, shows the probably similar character of experiments of Dareste, Metrophonow, and others on the embryology of the chick.

The paper next dealt with special examples of abnormal chick embryos which have come under the writer's observations quite recently, several specimens of which were exhibited.

Various phases of irregularity were noted, such as imperfectly developed embryos; in some only the head-fold; in others hardly beyond the primitive groove; in some other embryos degeneration of the whole blastoderm, even after considerably advanced stages. Several cases of double and triple embryos were noted.

20. 'On a peculiar Fusion of the Gill-filaments in certain Lamellibranchs,' by Edward L. Rice.

In many folded types of lamellibranch gills the examination of serial sections perpendicular to the filaments shows a large number of filaments in the upper portion of the gill, which gradually meet and fuse to a relatively small number as the free margin is approached. Thus in *Cardium edule* a reduction of 23 filaments to 6 was noted.

The fusion is usually almost exclusively limited to a narrow band in the near vicinity of the free borders of the gill, where the folding of the lamellæ is necessarily much reduced. Another zone of fusion may be noted, in cases where the outer gill is produced to form a dorsal appendage, at the transition from the gill proper to the appendage. Here again the fusion is correlated with a reduction in the folding.

Is this phenomenon really a fusion or a

branching of the original filaments? At the free border of the gill the filaments of one lamella go over without interruption into those of the other, and the number in the two lamellæ must in either case be equal. In the 'zone of fusion' the number becomes very unequal. Higher in the gill, where the maximum number is reached, the two lamellæ contain equal numbers of filaments, showing conclusively that the maximum is the original number.

This fusion was observed only in distinctively lamellar gills in which the folding is developed. It is most conspicuous in *Cardium*, *Batissa*, *Psammobia*, *Chama*, *Solenocurtus* and *Donax serra*; less developed in *Cyprina* (strong on the transition line of gill proper and appendage) and *Venus*; very slightly developed in *Solen*, *Mya*, and *Donax politus*. Though fusion was observed in *Cytherea*, *Donax trunculus*, *Ostrea*, and *Thracia*, nor in the outer gill of *Cardium* and *Psammobia*.

The fusion seems to have little systematic value, but to be mechanically correlated with the folding and the crushing due to the inelastic gill margin with an increasing number of filaments. The upper part of the gill of *Cardium*, if flattened, would measure some seven times the length of the free margin.

Apparently this fusion has not been noted in the literature, unless figures showing an unequal number of filaments in the two lamellæ, *within one fold*, point in this direction, *e. g.*, *Cardium* (van Haren), *Lima* (Pelseneer), *Donax trunculus* (Sluiter), *Ostrea* (Kellogg).

21. 'Experiments Upon Regeneration and Heteromorphosis,' by Chas. W. Hargitt. This paper reviewed a series of experiments carried on at the Marine Biological Station during the present summer upon regeneration among the Hydromedusae. The experiments of earlier investigators upon hydroids were repeated among various fam-

ilies and genera, and the most important results verified. The experiments upon medusæ were confined to the genus *Goni-onemus*, members of which from physiological habit loaned themselves quite readily to such work. While the series of experiments have not been completed, enough has been done to establish the capacity of even such specialized forms to regenerate various parts and organs with great readiness, and that both centrifugally and centripetally. Indeed, an apparent capacity for considerable heteromorphism.

22. The President of the Association read the next paper on 'The Penial Structures of the Saurians,' which was printed in abstract in the last number of this JOURNAL.

23. 'The Relationships of the North American Fauna,' was then presented by the chairman of the section, Vice-President Gill, and discussed at length by Prof. E. D. Cope and others. In the course of his remarks the author said: "The question of the extent and relationship of the North American Fauna have been several times discussed recently and very different conclusions deduced. I do not feel inclined to recede from the position taken years ago. It depends upon the reliance which is placed upon a special group whether we are lead to one view or another; for example, if we take the birds alone we may acknowledge the bonds that bind temperate northern America and Eurasia; if we take the lizards, the North American Group is simply an extension of the Southern; if we take the mammals, the reality of an Arctic region may be insisted on. But the acceptance of an Arctic region by no means clears away the difficulties; it rather doubles them, for we have then the task of defining the boundaries between that Arctic region and the North American, on the one hand, and the Eurasiatic, on the other. It seems best then to consider the Arctic lands as neutral territory and to correlate zoogeographical and geographical

data, recognizing the regions admitted by Sclater, Wallace and most other zoogeographers. The most significant evidence in favor of the distinction of the North American and Eurasiatic faunas is furnished by the fishes. Certainly the ichthyologist cannot subscribe to the union of the two into a single Holarctic region."

The Vice-Presidential address, 'On some Points in Nomenclature,' was read Monday p. m. and appears in full in the present number of this JOURNAL.

D. S. KELLICOTT,
Secretary.

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THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

MEETING in a great commerical center like Liverpool, and in a city which is the seat of a young but vigorous geographical society, it was to be expected that the Geographical Section of the British Association should be neither less active nor less popular than in former years. It may, perhaps, be the case that the large audiences, on several occasions approaching a thousand, were attracted by an unwontedly liberal use of the lantern for illustration, but no single slide was shown which was not either exhibited for the first time, or was not in a very special manner calculated to fix the impression produced by the papers. The Section met on five days, in the course of which 34 communications were made, almost all of them longer than the average of papers read in other sections. Limitation of discussion was therefore inevitable, and several points which might have led to lively debates had to be passed by in silence. There was no lack of variety in the program; indeed, the difficulty was to secure any sort of logical order in the nature of the papers read on a given day. The provisional program which provided for some such order had to be abandoned